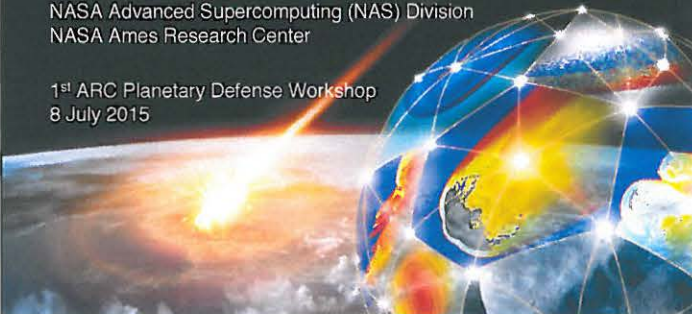



Sensitivity to Uncertainty in Planetary Defense Risk Assessment

Donovan Mathias
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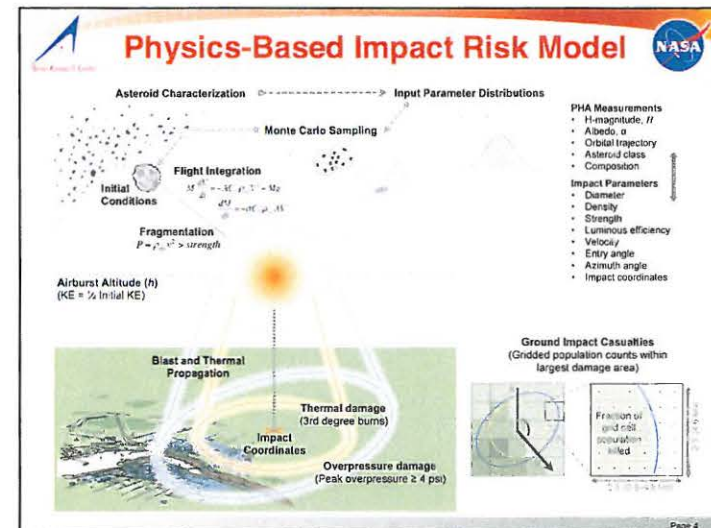
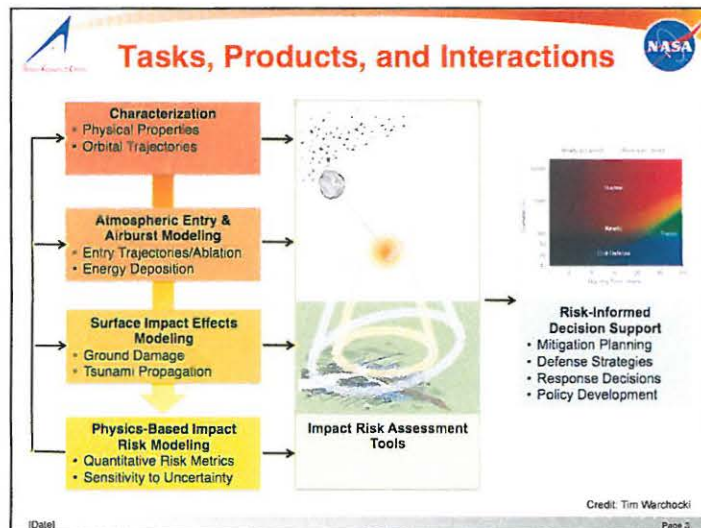
1st ARC Planetary Defense Workshop
8 July 2015

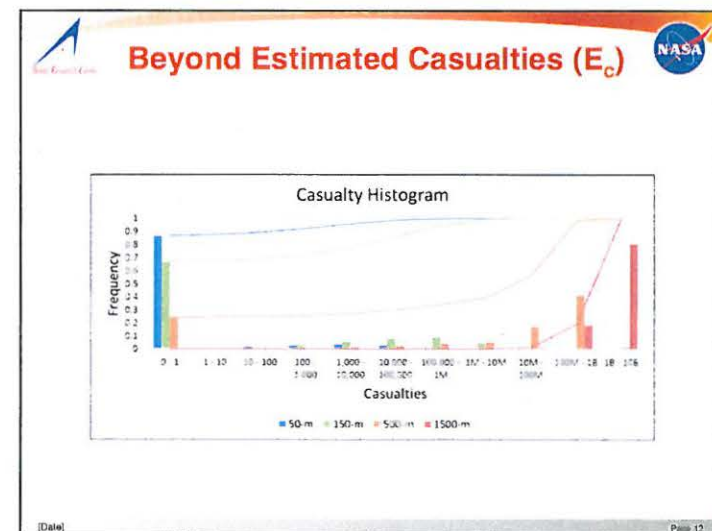
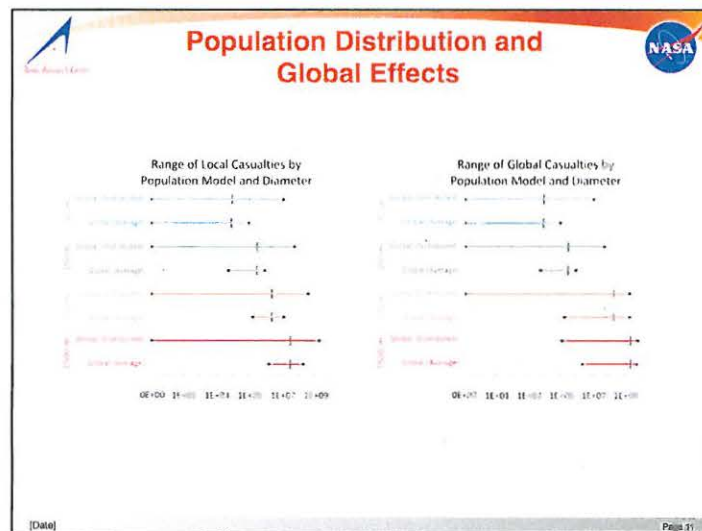
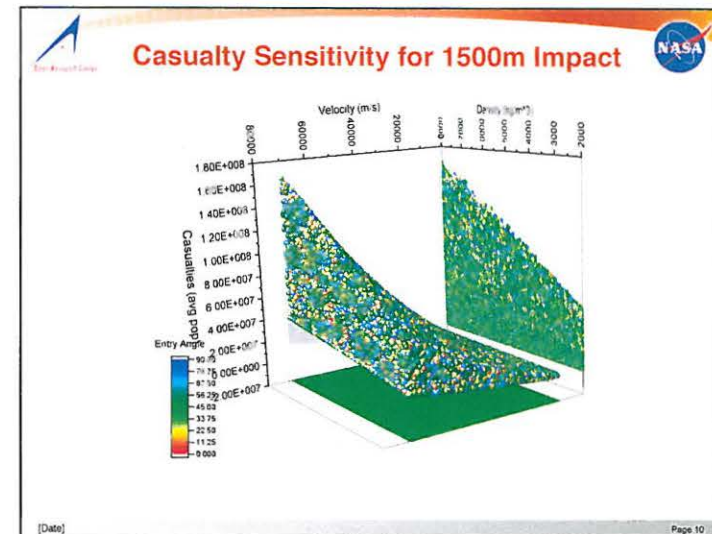
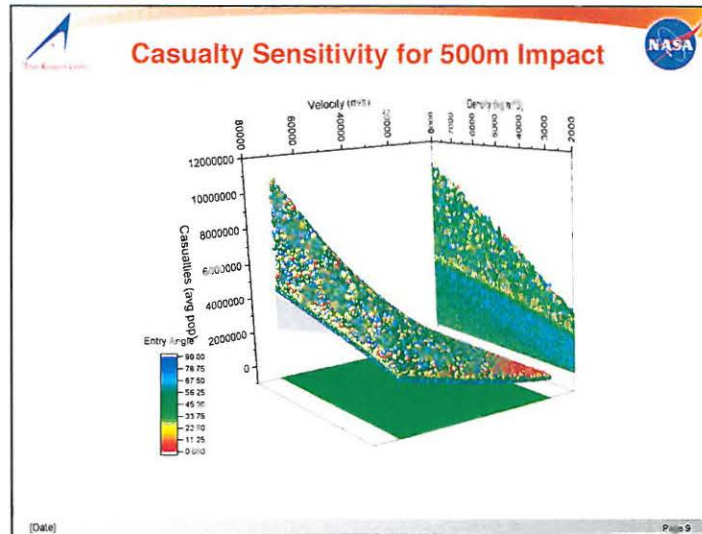



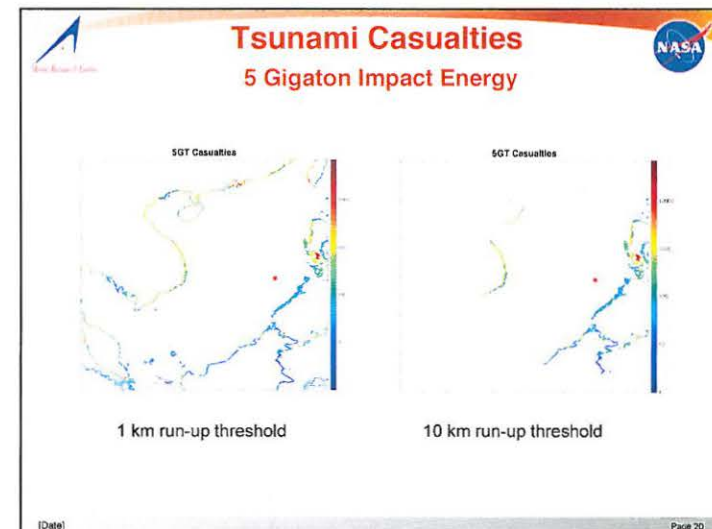
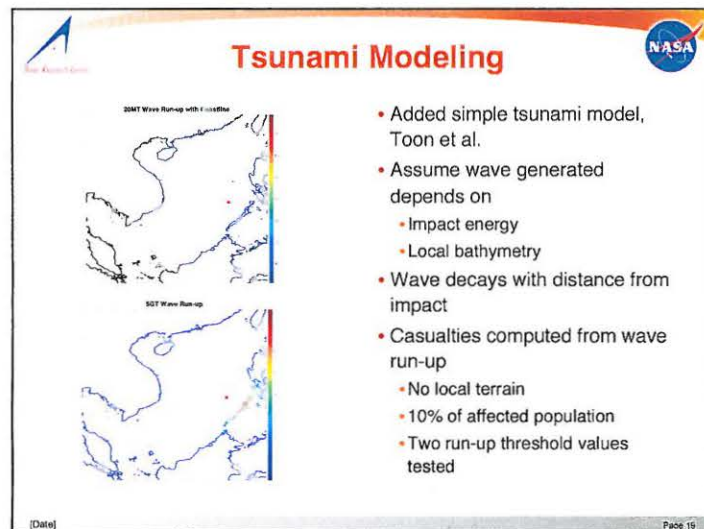
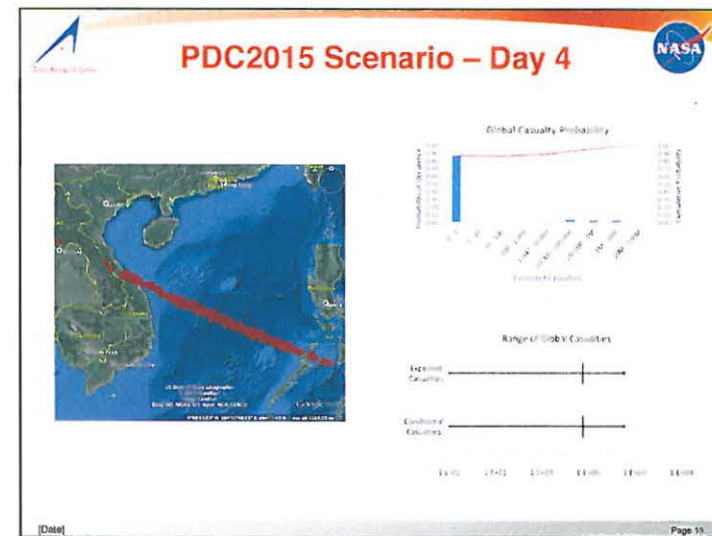
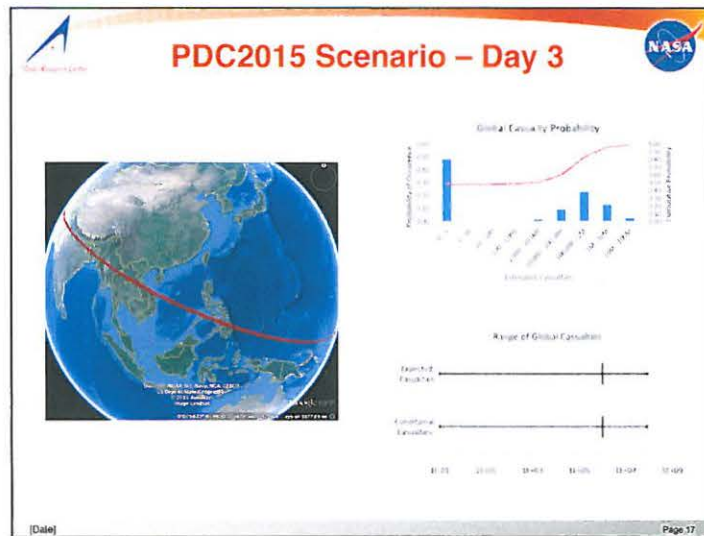
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Example 3: Problem Overview

- Goal
 - Assess inherent assumptions with literature airburst models
- Task scope
 - Define single, fixed-parameter impact scenario
 - Compare literature model results with those anchored in high-fidelity simulations?
- Questions
 - Are traditional meteoroid physics models sufficient for energy deposition prediction?
 - Ablation
 - Pancaking
 - Point-source airburst
 - How sensitive are ground damage estimates to these assumptions?

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Demonstration Case

- Test case parameters
 - Size = 20 m diameter
 - Density = 3 g/cc
- Flight path integration based on assumed initial state
 - 20 km/s
 - 20° entry angle
- Mass loss computed using high-fidelity simulation-generated relations
- Progressive fragmentation model used for breakup and energy deposition curve
- Blast footprint from spherical point source + CFD corrections
- Results compared with Chelyabinsk damage

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Simulation Elements

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Results

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